BULLETIN

OF THE INSTITUTE OF METALS

VOLUME 1 SEPTEMBER 1951 PART 1

THE NEW JOURNAL

An editorial notice in the August issue said a brief farewell to the octavo *Journal*, which all of us have known since our first acquaintance with the Institute. The Report of Council for 1950 had prepared us for the change, and now we have in our hands the first number with the quarto page. The larger page is accompanied by a new design of paper cover for the monthly *Journal*. I well know the anxious thought that your Council has given to both these matters before deciding to make a change, and I sincerely hope that members will approve the action which has been taken.

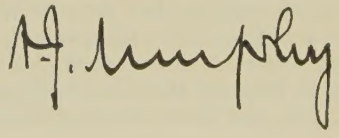
The increase in size of page is, of course, the more important of the changes. In making it we have the benefit of the experience of many other important scientific and technical societies, including the Royal Society, the Institution of Electrical Engineers, the Institution of Mechanical Engineers, the Iron and Steel Institute, and the Physical Society. The periodicals of these societies confirm our expectation that the new format of our *Journal* will permit larger illustrations where desirable and a more dignified presentation of papers, the less frequent breaks at page endings being especially pleasing and making for easier reading.

The change in format has mainly, however, been decided upon for financial reasons. It will be known to all members that the cost of producing the *Journal* has risen in far greater proportion than the amount of subscriptions, and the problem before the Council has been to find ways of maintaining and, if possible, increasing the service rendered by the Institute without adding to the burden on individual members. The Council has been advised that an increase to a quarto page would bring financial advantages and, since these would coincide with improved presentation of papers, it was felt that the Council would have been failing in its duty if it had not grasped the opportunity thus presented.

Many will naturally regret the necessity for the disappearance of the familiar small-paged *Journal*, but I believe there will be a warm welcome from all members for the new *Bulletin* in which I have the honour to include this message. It is intended that the *Bulletin* shall incorporate the Institute news and announcements, the news of Local Sections and Associated Societies, news of kindred societies and of joint activities, which have hitherto appeared at the beginning of the monthly *Journal*. I hope and confidently expect that the *Bulletin* will also become a medium for the discussion, by correspondence, of all non-ferrous metallurgical topics other than mining and extraction. The pages of this new publication should reflect the views of members on subjects which, although they may not be appropriate for placing on record with the scientific papers contributed for discussion at General Meetings of the Institute, are nevertheless of importance for the progress of metallurgical science and practice. From time to time papers prepared for Local Section meetings are recommended as being of interest to the general membership of the Institute, even though it may not be claimed that they possess the features of original work or a new survey which are looked for in papers published in the annual proceedings of the Institute. The *Bulletin* will often be the appropriate vehicle for these communications.

Taste in covers varies: some will applaud, others will be less enthusiastic over the design which graces this first issue in the new format. We believe that, apart from its intrinsic merit, it is likely to have an appeal for readers who may not be familiar with the aims and activities of the Institute's work and whom it is desired to attract to read our news or proceedings and the advertisements. All of us are anxious that the cover should be worthy of the Institute, and this I believe has been achieved, but let us reflect that the paper cover of the monthly *Journal* is in any case an ephemeral thing which will disappear when the contents are bound in the cloth boards of the annual volumes.

Publication is the function which absorbs the greater part of the income of the Institute, and I thought it fitting when so important a change was to be made in the appearance and content of the *Journal* that your President should re-state the considerations which had led to this step being taken. I do not feel that my statement needs to be defensive or apologetic; rather do I commend our new *Journal* to you as evidence of vigorous health in our constitution, and as a production worthy of the high traditions of the Institute.



INSTITUTE NEWS

Election to Fill a Casual Vacancy on the Council

In accordance with the powers granted in Article 28, the Council has nominated Mr. N. I. BOND-WILLIAMS, B.Sc., Chairman and Managing Director, Aston Chain and Hook Co., Ltd., Birmingham, to fill a vacancy for an Ordinary Member of Council, caused by the death of Mr. Harry Davies.

Mr. Bond-Williams will, as required by Article 28, present himself for re-election at the 1952 Annual General Meeting.

Election of Council for 1952–53

In accordance with the Articles of Association, the following are due to retire from the Council at the 1952 Annual General Meeting:

President:

Professor A. J. MURPHY, M.Sc.

Past-President:

Colonel Sir PAUL GUETERBOCK, K.C.B., D.S.O., M.C., T.D., D.L., J.P., M.A., A.D.C.

Vice-Presidents:

Major C. J. P. BALL, D.S.O., M.C.
C. J. SMITHELLS, M.C., D.Sc.

Honorary Treasurer:

W. A. C. NEWMAN, O.B.E., B.Sc., A.R.S.M., A.R.C.S., D.I.C.

Ordinary Members of Council:

D. F. CAMPBELL, M.A., A.R.S.M.
T. M. HERBERT, M.A.
H. W. G. HIGNETT, B.Sc.
A. R. POWELL

In addition, Mr. ALFRED BAER and Mr. BOND-WILLIAMS, who were appointed by the Council to fill casual vacancies during the year, also retire and present themselves for re-election, in accordance with Article 28.

Under Article 19, Professor A. J. MURPHY will fill the vacancy on the Council as Past-President.

In accordance with Article 22, the Council nominates the following members to fill the other vacancies:

As President:

C. J. SMITHELLS, M.C., D.Sc., Director of Research, The British Aluminium Company, Ltd., Gerrards Cross.

As Vice-Presidents:

G. L. BAILEY, M.Sc., Director, British Non-Ferrous Metals Research Association, London.

S. F. DOREY, C.B.E., D.Sc., Wh.Ex., F.R.S., Chief Engineer Surveyor, Lloyd's Register of Shipping, London.

As Honorary Treasurer:

E. H. JONES, Director and General Manager (Bristol), Capper Pass and Son, Ltd., Bristol.

As Ordinary Members of Council:

N. P. INGLIS, Ph.D., M.Eng., Research Director, Imperial Chemical Industries, Ltd., Metals Division, Birmingham.

IVOR JENKINS, D.Sc., Chief Metallurgist, Research Laboratories, General Electric Co., Ltd., Wembley.

A. G. RAMSAY, B.Sc., Ph.D., Director, The Mond Nickel Co., Ltd., and Works Manager, Clydach Refinery.

H. SUTTON, D.Sc., Director of Research and Development, Aircraft Materials, Ministry of Supply, London.

Major P. LITHERLAND TEED, A.R.S.M., Deputy Chief of Aeronautical Research and Development, Vickers-Armstrongs, Ltd., Weybridge.

W. J. THOMAS, Assistant Managing Director, The British Aluminium Co., Ltd., London.

Members are reminded that, in accordance with Article 22, any ten members may also at, or before, the business part of the Autumn General Meeting (16–18 September 1951), nominate in writing, with the written consent to act if elected of the person nominated, any duly qualified person other than one of those nominated by the Council to fill any vacancy on the Council, but each such nominator is debarred from nominating any other person for the same election. If two or more persons are nominated for any honorary office they (or such of them as are not Ordinary Members of Council who are not retiring at the next Annual General Meeting) will be deemed to have been nominated also for any vacancies among the Ordinary Members of Council. No person is eligible to fill any vacancy at such Annual General Meeting unless he has consented in writing to be nominated and has been nominated or deemed to be nominated for the same in compliance with this Article.

Senior Vice-President, 1952–53

The Council has elected Professor F. C. THOMPSON, D.Met., M.Sc., to serve as Senior Vice-President for the year 1952–53, and he will be their nominee for the Presidency in 1953–54.

Symposium on "Equipment for the Thermal Treatment of Non-Ferrous Metals and Alloys"

The following papers have been invited for this Symposium, which is being arranged in connection with the 1952 Annual General Meeting:

(1) "Electric Furnaces for the Thermal Treatment of Non-Ferrous Metals", by an author selected by the Electric Furnace Section of the British Electrical and Allied Manufacturers' Association.

(2) "Gas-Fired Furnaces for the Thermal Treatment of Non-Ferrous Metals", by Mr. J. F. Waight (West Midlands Gas Board).

(3) "Batch Thermal Treatment of Light Alloys", by Mr. C. P. Paton (Northern Aluminium Co., Ltd.).

(4) "Batch and Continuous Annealing of Copper and Copper Alloys", by Mr. Edwin Davis and Mr. S. G. Temple (Imperial Chemical Industries, Ltd., Metals Division).

(5) "Flash-Annealing of Light Alloys", by Mr. R. T. Staples (T.I. Aluminium, Ltd.).

(6) "Bright Annealing of Nickel and Its Alloys", by Mr. H. J. Hartley (Henry Wiggin and Co., Ltd.).

(7) "Continuous Thermal Treatment of Light Metals", by M. M. Lamourdedieu (Société Centrale des Alliages Légers).

The papers will appear together in the January or February 1952 issue of the *Journal*.

Informal Discussion on "Tool and Die Materials for the Hot Working of Non-Ferrous Metals"

The special General Meeting on this subject, previously announced, will be held at the University of Birmingham on the afternoon of Thursday, 3 January 1952. The chair will be taken by Mr. Christopher Smith.

Election of Members

The following 30 Ordinary Members, 1 Junior Member, and 6 Student Members were elected on 18 July 1951:

As Ordinary Members

ALLARD, Marc., Ing. civil des Mines, Directeur, Institut de Recherches de la Sidérurgie, 185 rue President Roosevelt, Saint Germain-en-Laye (S. et O.), France.

BLYTH, Howard Neville, B.A., Lecturer, Royal School of Mines, Prince Consort Road, London, S.W.7.

BUNTON, John D., Chief Metallurgist, C.A.V. Ltd., Warple Way, Acton, London, W.3.

CHEN, Neng-Kuan, Dr. Eng., Research Associate, Department of Mechanical Engineering, The Johns Hopkins University, Baltimore 18, Md., U.S.A.

CLAXTON, Cyril Charles, Joint Managing Director, Sheffield Twist Drill and Steel Company, Ltd., Sheffield.

ELLIS, Dennis Thomas, Chief Metallurgist, Jaguar Cars, Ltd., Coventry.

ENGLISH, Alan, Blast Furnace Assistant, Appleby-Frodingham Steel Co., Ltd., Scunthorpe, Lincs.

FATTAH, Mohamed Ahmed Abdel, B.Sc., Engineer, Ministry of Defence, Cairo, Egypt.

HARRIS, Arthur Clement, Assoc. Met., Research Metallurgist, Simon-Carves, Ltd., Cheadle Heath, Stockport.

HAUT, Frederick Joseph Georg, B.Sc., Constructional Engineer, Boxmoor Engineering Corporation, Ltd., Watford, Herts.

JONES, *Sir* Lewis, J.P., Secretary, The South Wales Siemens Steel Association, North Hill, 2 St. James' Crescent, Swansea.

LEWIS, George Leonard, Sales Engineer, Vickers (Eastern), Ltd., Killick Building, Home Street, Bombay, India.

LITTLEWOOD, Frederick Richard, Chief Designer, British Sewing Machines, Ltd., Lombard Road, London, S.W.19.

LOMBARDI, *Dott.* Paolo, Technical Management Official, Società Metallurgica Italiana, Borgo Pinti 99, Florence, Italy.

O'CONNOR, Kenneth, Manager, Foundry Sheet and Strip Division, Dominion Foils (Canada) Ltd., Cap de la Madeleine, Quebec, Canada.

ORLANDO, *Dott.* Giuseppe, Vice-Chairman, Società Metallurgica Italiana, Borgo Pinti 99, Florence, Italy.

PEPLOW, Douglas Boraston, Metallurgist, British Electricity Authority, Southern Division, 111 High Street, Portsmouth.

PRASAD, Rajendra, B.Sc., Assistant Professor of Metallurgy, College of Mining and Metallurgy, Benares Hindu University, Benares, India.

PRYOR, Horace, Works Manager, Humber Ltd., Coventry.

ROBINSON, Eric A., M.C., Managing Director, The Superheater Company, Ltd., 53 Haymarket, London, S.W.1.

RUSHWORTH, David, Fuel Economist, Albion Chambers, King Street, Nottingham.

SALAH EL-DIN NESSIM, Ahmad, B.Sc., Engineer, Ministry of Defence, Cairo, Egypt.

SANDBERG, Alexander Christer Edward, B.Sc., Consulting Engineer, 40 Grosvenor Gardens, London, S.W.1.

SARGEANT, Colin Wilfred, Works Manager, James Evans and Son, Ltd., Victoria Works, Bromford Lane, West Bromwich.

SCORTECCI, *Dott.* Massimo, General Secretary, Istituto Italiano della Saldatura, Via XX Settembre 8, Genoa, Italy.

SNEDDEN, George T., Colvilles, Ltd., Crosshill Street, Motherwell, Lanarkshire.

SPARKES, Edward John, Chemist, Blackburn Generating Station, British Electricity Authority, Blackburn, Lancs.

TALINI, *Dott.* Renzo, Chief of Chemical Laboratories, Società Metallurgica Italiana, Fornaci di Barga, Lucca, Italy.

WOOD, H. Carrington, Wellman Smith Owen Engineering Corporation, Ltd., 25 Wilton Road, London, S.W.1.

YATES, Harry, Managing Director, Smith and McLean, Ltd., 179 West George Street, Glasgow, C.2.

As Junior Member

MITCHELL, Neville M., Metallurgist, Royal Aircraft Establishment, Farnborough, Hants.

As Student Members

BRAINE, William Alan, Staveley Iron and Chemical Company, Ltd., Chesterfield.

MCLENNAN, John Andrew, Trainee Metallurgist, Metal Manufactures, Ltd., Port Kembla, N.S.W., Australia.

MIRZA, Mohammad Razi, B.A., Technical Apprentice, John I. Thornycroft and Co., Ltd., Woolston, Southampton.

NAYLOR, Graham L., Metallurgical Apprentice, Stewarts and Lloyds, Ltd., Bilston, Staffs.

PLACKETT, John Ronald, Student of Metallurgy, University of Birmingham.

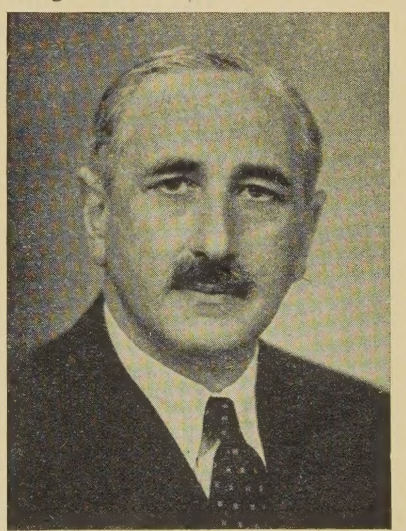
ROLLS, Roger, Research Assistant, Taylor Brothers and Co., Ltd., Trafford Park Steel Works, Manchester, 21.

PERSONALITIES

Mr. A. M. Baer

(Member of Council)

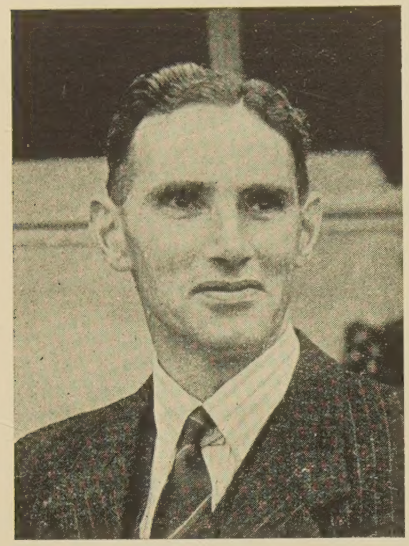
Alfred Baer was born in London in 1896 and educated at Harrow and Balliol College, Oxford. After his education had been interrupted by the 1914–18 War, in the course of which he served in Gallipoli and France, Mr. Baer took a B.A. degree and was called to the Bar of the Inner Temple. He entered industry when he joined Messrs. Henry Gardner and Co., Ltd., in 1920; he was appointed a director of the company in 1927. Throughout the last war he acted as Joint Controller of Non-Ferrous Metals. Last year he was appointed Vice-Chairman of The Consolidated Zinc Corporation, Ltd. In addition, Mr. Baer is Chairman of H. J. Enthoven and Sons, Ltd., a member of the Eastern Gas Board, and a director of The Zinc Corporation, Ltd., Imperial Smelting Corporation, Ltd., and New Broken Hill Consolidated, Ltd., among other companies.



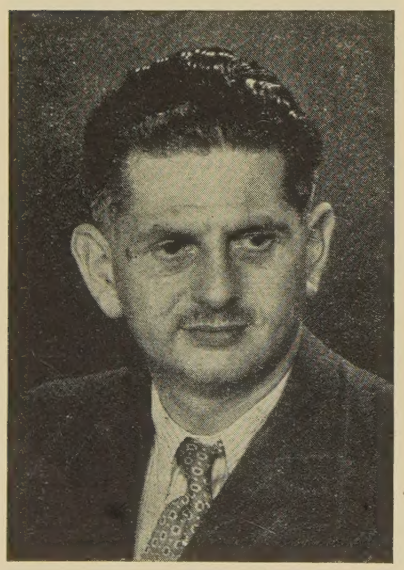
[*Elliott and Fry, Ltd.*

Mr. E. A. G. Liddiard
(Chairman of the London Local Section)

Edwin Andrew Guthrie Liddiard was born in 1903 and educated at Christ's Hospital. From 1922 to 1925 he was a laboratory assistant with Messrs. Cammell, Laird and Co., Ltd., Sheffield, and studied at the University in the evenings. The next three years were spent at Cambridge, where he took the Natural Science Tripos, Part I, and in his final year studied metallurgy under Heycock. From 1928 to 1932 Mr. Liddiard was a Research Metallurgist with I.C.I. (Fertilizers and Synthetic Products), Ltd., Billingham. He then joined the British Non-Ferrous Metals Research Association as Assistant Development Officer. Later he was appointed Assistant Research Superintendent (1937) and Research Manager of the Association (1943). When the Fulmer Research Institute was established in 1946, Mr. Liddiard was appointed Director, a position he still holds. He has taken an active part in Institute of Metals affairs and has for the last two years been a member of the Publication Committee.



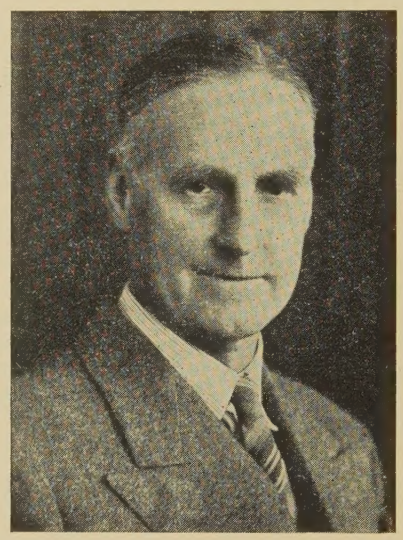
Dr. H. M. Finniston
(Chairman of the Oxford Local Section)



Harold Montague Finniston was born in 1912 and educated in Glasgow, where he attended the University and the Royal Technical College. He graduated with first-class honours in metallurgy in 1933. After a period in industry with Messrs. Stewarts and Lloyds, Ltd., he returned to Glasgow in 1937 as Chief Research Officer of the Scottish Coke Research Committee. Having gained his Ph.D. degree in 1940, Dr. Finniston joined the Bragg Laboratory of the Naval Ordnance Inspection Department, Sheffield, where he was in charge of the Metallurgy Section until 1946, when he was seconded by the Royal Naval Scientific Service to the Department of Atomic Energy. He went to Canada to organize the metallurgical side of the atomic-energy work there, and on his return in the following year became Deputy Head of the Metallurgy Division of the Atomic Energy Research Establishment at Harwell. In 1948 he was appointed to his present post of Head of the Metallurgy Division, with the rank of Deputy Chief Scientific Officer.

Mr. John Arnott
(Chairman of the Scottish Local Section)

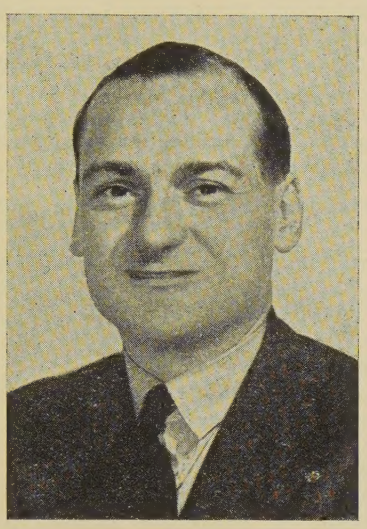
John Arnott was born in 1891 and educated at Ardrossan Academy. After leaving school, he became a premium student in the laboratory of Messrs. Tatlock and Thomson, city analysts of Glasgow, and a student in the Royal Technical College, Glasgow. He later spent some time in a small consulting laboratory where the work was mainly metallurgical. Joining the firm of G. and J. Weir, Ltd., Cathcart, in 1913, he has remained with them ever since, and is now their Chief Metallurgist. Mr. Arnott is the author of many papers and articles on non-ferrous metallurgical subjects. He is a Fellow of the Institution of Metallurgists, a Fellow of the Royal Institute of Chemistry, and a member of the Society of Chemical Industry, the Institute of British Foundrymen, the West of Scotland Iron and Steel Institute, and other bodies.



Mr. M. M. Hallett
(Chairman of the Sheffield Local Section)

Michael Mountjoy Hallett was born in 1911 and educated at King's School, Worcester, and University College, Cardiff, where he graduated in metallurgy in 1931 and took the M.Sc. degree in 1939. After graduation, he was awarded an industrial bursary by the Royal Commissioners for the Exhibition of 1851, and spent the next two years in the Research Laboratory of The Mond Nickel Co., Ltd., Birmingham. In 1933 he was appointed to the permanent staff of the same laboratory and worked on the scaling of low-alloy steels, on the development of heat-resisting alloys, and particularly on the various types of nickel cast iron. In 1943 he was appointed Chief Metallurgist of the Sheepbridge Stokes Centrifugal Castings Co., Ltd., and in 1949 became

Chief Metallurgist to the Sheepbridge Engineering, Ltd., Group. He has published papers on metallurgical aspects of alloy cast irons, and on corrosion-resisting alloys. He is a



member of the Institute of Marine Engineers and of various other societies, both British and American. He serves on several committees of the British Cast Iron Research Association and the Institute of British Foundrymen.

PERSONAL NOTES

Mr. V. T. Balasubramanian has returned to India, where he will be in charge of the foundry of India Pistons, Ltd., Madras.

Dr. C. S. Barrett, of the Institute for the Study of Metals, Chicago, is visiting this country and will for a time be working in the Metallurgy Department at Birmingham University.

Mr. K. W. J. Bowen has been awarded the degree of Ph.D. of Cambridge University.

Mr. C. L. M. Cottrell has been appointed Assistant Chief Metallurgist (ferrous metals) to the British Welding Research Association.

Mr. C. J. Dangerfield has transferred from the Research Laboratories of The British Aluminium Co., Ltd., to the Company's works at Warrington.

Mr. H. E. Dixon has been appointed Chief Metallurgist (non-ferrous metals) to the British Welding Research Association.

Mr. J. Dodd has been awarded the degree of B.Sc. in Applied Science (Metallurgy) at Durham University.

Mr. A. G. Duce has been awarded the Ph.D. degree of Cambridge University.

Dr. Hugh Ford has been appointed Professor of Applied Mechanics in the University of London. The appointment, which is tenable at Imperial College, will have effect from 1 October 1951.

Mr. E. R. Francis has been appointed Technical Information Officer to The Mond Nickel Co., Ltd.

Dr. Max Hansen has been appointed Assistant Chairman of the Metals Research Department of the Armour Research Foundation of the Illinois Institute of Technology, Chicago. He was previously Supervisor of Physical Metallurgy Research of the Foundation.

Mr. A. R. Harding has been awarded the degree of Ph.D. of Birmingham University.

Mr. P. T. Houldcroft has been appointed Assistant Chief Metallurgist (non-ferrous metals) to the British Welding Research Association.

Mr. G. Lucas has been awarded the Ph.D. degree of Durham University.

Mr. G. H. Noordhof has been appointed Talks Producer in the B.B.C. Television Service and will be concerned mainly with scientific and medical programmes.

Dr. E. Orowan has been appointed George Westinghouse Professor of Mechanical Engineering at the Massachusetts Institute of Technology.

Mr. A. R. Palmer has left England to take up an appointment with the Colonial Development Corporation in Tanganyika.

Miss E. W. Parker has been appointed Assistant to the Manager of the Development and Research Department of The Mond Nickel Co., Ltd.

Mr. M. S. Paterson is returning from the Institute for the Study of Metals, Chicago, to Australia, where his address will be Aeronautical Research Laboratories, Department of Supply, Box 4331, G.P.O., Melbourne, C.1.

Dr. K. Winterton has been appointed Chief Metallurgist (ferrous metals) to the British Welding Research Association.

Mr. A. Wipperman, for a number of years on the staff of the Industrial Division of Johnson, Matthey and Co., Ltd., has recently left for Australia, where he will take up a senior appointment with the Company's Australian associate, Garrett, Davidson, and Matthey Pty., Ltd., 824 George Street, Sydney, N.S.W.

Deaths

The Editor regrets to announce the deaths of:

Mr. Frederick William Dingwall (Original Member), Chairman and Managing Director of Everitt and Co., Ltd., Liverpool.

Mr. Alfred Holley Mundey on 5 July at the age of 83. He was formerly Technical Director of Fry's Metal Foundries, Ltd., and served on the Council of the Institute in his capacity as Chairman of the London Local Section in 1927–28 and as an Ordinary Member of Council from 1930 to 1938.

NEWS OF LOCAL SECTIONS AND ASSOCIATED SOCIETIES

Official Visits by the President

The President, accompanied by the Secretary, will pay official visits to Local Sections and Associated Societies as detailed below:

Wed., 7 Nov. 1951. Manchester Metallurgical Society.
Thur., 8 Nov. 1951. London Local Section.
Tues., 15 Jan. 1952. South Wales Local Section.

Leeds Metallurgical Society

Dr. R. Goodacre has succeeded Mr. F. Lindars as Secretary of the Society.

JOINT ACTIVITIES

Joint Committee on Metallurgical Education

MR. D. R. O. THOMAS has accepted an invitation to serve as Chairman of the Joint Committee in succession to Mr. E. G. Lawford.

Notch-Bar Testing of Materials in Relation to Welded Construction

The Joint Committee on Materials and Their Testing, in association with the Institute of Welding, announces a Symposium on "Recent Developments in Notch-Bar Testing of Materials and Their Relation to Welded Construction," to be held in London on Wednesday, 5 December 1951.

Papers are being invited from a number of British and foreign experts and will be preprinted and introduced by a rapporteur, with a view to discussion, which will occupy two sessions, one in the morning and one in the afternoon. Further particulars will be issued shortly.

NEWS OF KINDRED SOCIETIES

The Institution of Metallurgists

The following elections have recently been announced:

As Fellows

F. A. Forward (University of British Columbia), B. R. Nijhawan (National Metallurgical Laboratory, Jamshedpur, India), J. R. Rait (Hadfields, Ltd.), J. Taylor (Royal Technical College, Glasgow).

As Fellows from the Grade of Associate

J. W. Houghton (Park Gate Iron and Steel Co., Ltd.), H. Padget (Dorman Long and Co., Ltd.), T. Powell (British Electro-Metallurgical Co., Ltd.), O. R. Smith (Aluminium Laboratories, Ltd.).

As Associates

E. Calvert (Richard Johnson and Nephew, Ltd.), R. Clark (Thomas Firth and John Brown, Ltd.), L. J. Derham (Imperial Smelting Corporation, Ltd.), D. A. Driffill (Hadfields, Ltd.), J. A. Garner (Steel, Peech and Tozer), W. H. L. Hooper (Imperial Chemical Industries, Ltd., Metals Division), E. L. James (John Garrington and Sons, Ltd.), R. Mercer (Enfield Rolling Mills, Ltd.), C. G. Nicholson (Thomas Firth and John Brown, Ltd.), N. W. Thomson (B.S.A. Tools, Ltd.), W. O. Turton (John Baker and Bessemer, Ltd.), K. G. Wood (Cumberland Technical College).

As Associates from the Grade of Licentiate

I. C. H. Hughes (The Mond Nickel Co., Ltd.), I. P. McDowall (Stewarts and Lloyds, Ltd.), S. D. Pitt (Bundaberg Foundry Co., Ltd.), P. J. Rowling (Powers Samas Accounting Machines, Ltd.), H. J. Sharp (Hoover, Ltd.), H. Simms (Appleby-Frodingham Steel Co.), J. S. Thompson (Durham Chemicals, Ltd.), R. E. H. Williams (Powell Duffryn Technical Services, Ltd.), L. A. Willsmere (Ministry of Fuel and Power).

As Licentiates

J. S. Ambler (Eastern Smelting Co., Ltd.), E. H. Bridges (Davy and United Roll Foundry, Ltd.), L. J. Holton (Acloque and Co.), A. W. Meadows (Dudley Drop Forging Co., Ltd.), G. W. Miles (Edgar Allen and Co., Ltd.), A. S. Narayanan (Tata Iron and Steel Co., Ltd.), K. A. Oliver (C. Akrill Co., Ltd.), D. A. Ryder (Joseph Lucas (Gas Turbines), Ltd.), P. Tharmalingam (Government of Ceylon), P. J. Wakeman (Hale and Hale, Ltd.).

International Congress on Industrial Chemistry

The Twenty-Fourth International Congress on Industrial Chemistry will be held in Paris from 25 November to 1 December 1951. The proceedings of the Congress will be divided in 19 sections, one of which will deal with metallurgy. An exhibition will take place simultaneously with the congress. Full particulars may be obtained from the Société de Chimie Industrielle, 28 rue Saint-Dominique, Paris (7e).

Symposium on Mineral Dressing, September 1952

Arrangements are now being made by the Council of the Institution of Mining and Metallurgy to hold a two-day Symposium on Mineral Dressing on 23 and 24 September 1952, at the Imperial College of Science and Technology, South Kensington, London, S.W.7.

The purpose of the Symposium will be to discuss recent developments (*a*) in fundamental concepts and experimental methods, (*b*) in practice at selected plants of particular interest, and (*c*) in plant design and machine manufacture.

Several papers are already in preparation, and others are being considered by prospective authors. Anyone who wishes to submit a paper is invited to send a synopsis of its contents and an indication of its probable length to the Secretary of the Institution, Salisbury House, London, E.C.2.

All papers accepted for the Symposium will be sent as preprints to those who propose to attend the two-day discussion, and a volume containing the papers and a report of the discussion will be published after the meeting.

OTHER NEWS

Research on Creep and Fatigue Properties of Metals at Elevated Temperatures

Shortly after the end of the war, the Light Alloys Sub-Committee of the Ministry of Aircraft Production Metallurgical Research Committee reviewed the position in the field of research on creep and fatigue properties of metals at elevated temperatures. Under the chairmanship of Professor L. Aitchison, a policy was framed for the guidance of workers employed on investigations for the Government Services on creep. A memorandum incorporating the Sub-Committee's recommendations on this subject was drafted in 1947. At the same time thought was given to corresponding investigations on fatigue.

When, in 1948, the Ministry's Research Committee was superseded by the Inter-Service Metallurgical Research Council, consideration of this subject was continued by the Non-Ferrous Metals Committee of that Council under the chairmanship of Mr. (now Professor) A. J. Murphy. In due course a further memorandum was produced, incorporating that Committee's recommendations on research on the fatigue of metals at elevated temperatures.

These memoranda were primarily intended to help in the formulation of Government research policy. No extensive series of researches was directly initiated to implement these various recommendations, which were regarded as providing a co-ordinating policy within which investigations in this field could, if attention were paid to the broad aspects suggested in the memoranda, be directed towards the provision of information of the greatest general benefit. Research into the mechanism of creep and fatigue was not regarded as coming within the scope of these recommendations.

Within the somewhat limited range of laboratories concerned, this policy has met with success. Investigators studying some particular application of metals or alloys at high temperatures have been pleased to broaden their work to bring it within the scope of the general recommendations made. For this reason the Non-Ferrous Metals Committee of the Inter-Service Metallurgical Research Council has recommended the issue of a general statement summarizing the views expressed and recommendations made in the earlier memoranda, with the object of giving an opportunity to all investigators working in this field to modify and direct their researches in such a way as to contribute the maximum amount of useful information on the behaviour of metals and alloys when subject to creep and fatigue conditions at high temperatures.

The approach to this matter by the Committees concerned has been a desire for the greatest amount of fundamental information on the behaviour of metals under these conditions. It is inevitable that many laboratories are primarily concerned with providing data on the creep and fatigue resistance of specific alloys. The values thus obtained are available to engineers, and may contribute in some measure to the general understanding of the phenomena concerned. It may happen, however, that those investigators who have made tests with a view to providing data are not in a position to extend them sufficiently to provide information of fundamental scientific value. There are, within the Committee's knowledge, certain researches in this field which could be so extended with little additional time and effort and whose value, therefore, in their contribution to our general knowledge, could be greatly enhanced.

This note is not published with the intention of attracting a number of new workers into this field. Admittedly, an enormous amount of further knowledge on these subjects is needed, but, in view of the heavy demands for research workers on other aspects of metallurgy, an intensive attack on creep and fatigue might absorb an effort that would be out of proportion to the probable immediate benefits. Publication, however, will have served its purpose if it encourages those who of necessity or by desire are working in this field to try to fit their investigations into the framework which is here described.

Factors Recommended for Consideration

It is suggested that the most important general approach in this matter should be an orderly investigation of the influence of variables in metallographic structure and in composition on creep and fatigue resistance at elevated temperatures. The following factors are considered to be important:

A. *Factors Relating to the Matrix :*

(i) Grain-size.

(ii) Orientation.

(iii) The effect of previous mechanical strain and of the manner in which this is effected.

(iv) Effect of solute metals present in alloying proportions in solid solution.

(v) Effect of small amounts of dissolved impurity.

(vi) Crystal structure of the matrix crystals (i.e. face-centred or body-centred cubic, hexagonal, &c.).

B. *Factors Relating to the Second, " Dispersed " Phase :*

(i) Distribution of particles (e.g. grain-boundary distribution or uniform distribution).

(ii) Particle size.

(iii) Amount of second phase present.

(iv) Nature of second phase present (whether " intermetallic compound " or " electron compound ", &c.—influence of crystal structure and other properties of second phase).

C. *Temperature-Dependent Factors :*

Relaxation towards equilibrium of non-equilibrium structures at the elevated service temperatures, recrystallization, grain growth, absorption or globularization of precipitates, &c., and the influence of stress on such structural changes.

Materials Recommended for Study

As will be obvious from the fact that this approach to the subject was suggested by the Light Alloys Sub-Committee, aluminium alloys were primarily in mind at the outset. It was, however, felt throughout all these discussions that the work should not be confined to aluminium alloys, but that a number of different solute and solvent metals must be considered if information of general application is to result. The Committee has accordingly made the following more specific recommendations.

Bearing in mind the large number of variables referred to above, it is clearly necessary to choose for examination systems in which there is a reasonable prospect of studying these factors separately and in which, therefore, such factors as alloy constitution are already well known. It is furthermore considered that the work should be carried out using pure materials so that the effects of impurities may later be investigated separately, and that in the initial stages of the work the materials should be in structural equilibrium at the temperature of the test before the start of the test. The information resulting as to the behaviour of the material under such controlled conditions will provide a background against which subsequent work on the behaviour of non-equilibrium structures is less difficult to interpret. The importance of a full and detailed description of the specimens tested and of their method of manufacture, including surface finish, cannot be over-emphasized. In some investigations already in progress or contemplated, it may only be possible to make a specific and accurate measurement of grain-size, composition, and any tendencies to preferred orientation in the specimens used and to record all available details of their history. The provision of such information gives a greatly enhanced value to the results of what might otherwise be an *ad hoc* creep or fatigue test on an ill-defined specimen.

(a) *Factors Relating to the Matrix*

For studies of the effect of factors associated with the matrix, the alloys chosen must remain reasonably homogeneous over a range of compositions and temperatures. In this section of the work investigations on pure metals and on single crystals had rather less encouragement than the investigation on alloy systems, except in so far as the study of the pure metal is necessary to compare its behaviour with that of a solid solution based thereon. While, in Section A, item (iv) is perhaps receiving the greatest emphasis in work now in progress, the other items should clearly receive simultaneous consideration, since the behaviour of a polycrystalline aggregate will be profoundly affected by grain-size, orientation, and other such matters.

Alloy systems particularly mentioned as worthy of consideration in this part of the work are the aluminium–zinc and aluminium–magnesium alloys and copper-base alloys in which the valency of the solute can readily be varied (the lattice distortions produced by a large number of elements in copper are accurately known, and can therefore be directly compared with mechanical properties). Magnesium alloys,

such as those with cadmium or aluminium, provide materials based on a hexagonal metal, and iron, which can exist in face-centred cubic and body-centred cubic forms, provides an opportunity of correlating properties with changes in crystal structure.

(b) *Factors Relating to the Second Phase*

Systems in which the second phase is completely insoluble in the solid state are difficult to find, but some work is in progress in co-operating laboratories on the aluminium–iron and lead–copper systems, where this condition is approached.

The effects of the mode of occurrence, distribution, and particle size of a dispersed phase could be studied in the system aluminium–copper, about the precipitation processes in which much is already known. In this case a definite intermetallic compound of limited homogeneity range is formed. Research should preferably be planned to include the effects of different types of dispersed phase. Many systems of the " aluminium plus intermetallic compound " type are available, while in the system aluminium–magnesium there is an intermediate phase of relatively wide homogeneity range. It may be necessary at some stage of the work to extend investigations to the effect of second phases of the " electron compound " type, in order to complete the picture.

(c) *Temperature-Dependent Factors*

The effect of these variables could be examined using the aluminium–copper system or perhaps, better, in some system such as aluminium–magnesium, where the variation of solubility with temperature is more pronounced.

General Observations

It is not intended in this note to do more than indicate an approach to the problem and a general line of thought. Metallurgists will no doubt think of alloy systems other than those mentioned above, a study of which could profitably form a part of the general investigation here outlined. It is desired to emphasize only that a programme of this general type might be expected to give information with regard to the effects of several factors treated, as far as possible, separately. The success or otherwise of the correlation would tend to reveal whether factors other than those enumerated should be considered. More complex alloys, more nearly related to alloys at present in service, could then be examined and developed in the light of the knowledge gained.

It cannot be too strongly emphasized that there is no desire or intention in the minds of the Committee to direct researches on creep and fatigue of metals into any unduly narrow channel. The Committee's object is only to call the attention of all interested parties to the desirability of carrying out work in this field on such materials and in such a way, wherever possible, as to make the most effective contribution to our structure of knowledge on the subjects.

The Non-Ferrous Metals Committee would welcome information as to the particular researches of investigators working in this field. Those interested should communicate with the Secretary, Non-Ferrous Metals Committee, Inter-Service Metallurgical Research Council, Metallurgy Department, Royal Aircraft Establishment, Farnborough, Hants.

Post-Graduate Courses in Structures and Materials

A post-graduate course in Theory of Structures and Strength of Materials, extending over one year (October to June), will begin at the Department of Engineering, Cambridge University, on 8 October 1951.

The latest advances made in the understanding of the behaviour of metallic structures under static, repeated, or fatigue loading, will be the principal subject of the course, with particular emphasis on welding as a method of fabrication. No attempt will be made to teach conventional methods of design, but present-day practice and possible future developments will form the subject of critical study.

The object of the course is not to train research workers, but to help engineers to apply the latest advances in knowledge. The course will include lectures, colloquia, and laboratory work, and each student will be encouraged to make a detailed study of some problem of particular interest to him.

The course is open to University graduates with industrial experience, and also to students who have suitable equivalent qualifications.

Applications for admission should be sent to the Secretary, Faculty Board of Engineering, Engineering Laboratory, Cambridge, from whom further particulars may be obtained.

British Non-Ferrous Metals Federation

The following officers of the Federation have been appointed for the year 1951–52: *President*, Mr. W. J. Terry; *Past-Presidents*, Dr. Horace W. Clarke and Mr. W. H. Henman; *Vice-Presidents*, Mr. W. F. Brazener, Mr. H. C. Gibbins, and Mr. H. E. Jackson; *Treasurer*, Mr. A. L. Johnson; *Chairman of the Executive Committee*, Mr. W. J. Terry.

Members of Council elected for the year are:

Brass and Copper Tube Association: Mr. L. Endall, Mr. H. C. Gibbins, Mr. S. G. S. Heinrich, and Mr. W. R. D. Macdonald.

Cold-Rolled Brass and Copper Association: Mr. W. F. Brazener, Dr. Horace W. Clarke, Mr. A. Dando, and The Hon. John Grimston.

Extruded Brass and Copper Alloy Association: Mr. J. C. Colquhoun, Mr. G. Meredith, Mr. E. J. Overton, and Mr. T. A. M. Roberts.

High-Conductivity Copper Association: Mr. A. L. Johnson, Mr. M. A. T. Johnson, Mr. W. J. Terry, and Mr. F. Waine.

Manufactured Copper Association: Mr. C. E. Prosser and Mr. W. F. Slater.

Brass Wire Association: Mr. C. F. Aston and Mr. A. S. Hollings.

Zinc Rollers' Association: Mr. S. C. Hunn and Mr. E. N. Rowbotham.

Nickel Silver Association: Mr. F. Geo. Allen and Mr. W. H. Henman.

Non-Electrical Copper Association: Mr. G. E. Jewell and Mr. P. Shakespeare.

Condenser Plate Association: Mr. S. G. Homfray and Mr. H. E. Jackson.

Brazed Brass Tube Association: Mr. H. J. Bailey and Mr. G. A. D. Smith.

APPOINTMENTS VACANT

METALLURGISTS required to assist on a variety of problems in the Metallurgical Section of the Central Research Laboratories of British Insulated Callender's Cables, Ltd., at Shepherd's Bush, W. 14. Good qualifications and research experience essential. Knowledge of the plastic working and physico-mechanical properties of metals desirable. Applications giving details of qualifications, experience, and salary required should be made to the Staff Officer, British Insulated Callender's Cables, Ltd., 21 Bloomsbury Street, London, W.C.1.

YOUNG METALLURGIST with experience in CASTING TECHNOLOGY required for research work on new light casting alloys. Position requires initiative and ability to work with minimum supervision. Apply in writing giving details of qualifications and experience to Secretary, Magnesium Elektron, Ltd., Clifton Junction, Nr. Manchester.